INDEX.

ABNEY, Capt., and Festing, Major-General, on photometry of the glow lamp, 608, 635
Accident on the Blackpool Tramway, 219
„ The Chevington railway, 625
„ The Hexthorpe, 306, 329, 601
„ with the electric car system, 169
Accidents, Fatal, from electric shocks, 382, 650
„ in mines, 405, 544
„ Railway, 249
Accounts of the Inventions Exhibition, 195
Accumulator, An efficient, 325
„ Tamine's, 88
„ Desmazures', 422
Addenbrooke, G. L., on shocks from alternating currents, 338
„ „ „ Westinghouse system of electric lighting, 464
„ „ „ on wiring, 651
Adelaide Jubilee Exhibition, 293, 373 493, 518, 620
Admiralty contracts, 323
Advertising, 244
Aesthetic town councillor, 194
Affairs of W. E. Irish, 494
Alleged perpetual motion, 284
Allin's water motor, 392, 405
Alternating current machines, 526
„ currents, Safety of, 350
„ „ Shocks from, 338
Aluminium, Attempts to obtain, by the dry way, 75, 99, 131
„ Production of, 169
„ salts, Electrolysis of, 4, 29, 52
„ steel, 297
American Bell Telephone Company, 667
„ electric railways, 640
„ „ lighting system in Australia, 667
„ Government telegraph system proposed, 566
„ Institute Electrical Exhibition, 138, 373
„ National Electric Light Association, 219, 238, 266, 292
„ notes, 586
„ system of arc lighting, 515
„ telephone patents, 119, 395
Ampère and voltmeters, Imhoff's, 298
Analysis of dynamo design, 463
Another plea for technical training, 192
Antifriction alloy, 595
Antwerp Exhibition, 243
Application of the deciampère or the centiampère to the determination of the electromotive forces of voltaic cells, 575
Arbitrary central station company, 225
Arc lamp, The Luther, 486
„ lamps, Small, 544
„ lighting, American system of, 515
„ „ in America, Price of, 516
Armstrong's Electric Light and Power Company, 549
Army signalling, The electric light and, 196
Athletic sports, Telegraphists', 196
Atlantic cable differences, 406, 446, 619
„ „ rates, 169, 196, 267, 468
„ „ repairs, 217, 242, 639
Augustus Harris and fire precautions in theatres, 349
Austrian Bell telephone patent annulled, 575
Automatic cut-out, 117

BALLOON signalling, 518
Barnacles, Electro-deposition of, 620
Battery, Case's, 283
„ D'Humy's, 98, 297, 406, 421
„ Disher's, 626
„ Eclipse, 73, 130, 146, 153, 167, 169, 178, 196, 243, 430, 454
„ Liepmann, 417, 502, 519
„ Maiche's, 270
„ Reckenzaun's secondary, 237
„ Reversible, 40
„ Schanschieff's, 202, 539, 545
„ Union, 138
„ Water primary, 98, 225, 250, 545
Bell Telephone Company, 639
Bennett, A. R., on metallic circuits for telephone lines, 560
Berthoud-Borel cables, 515
Bessbrook and Newry tramway, 574
Bever's high speed engine, 435
Big electrical litigation, 349
Blackpool electric tramway, 129, 193, 219, 221
Blakey-Emmott dynamos, 506
Blodgett, Geo. W., on the electric lighting of passenger trains, 57
Boiler contracts, 594
Bonta telephone, 235
Boss electric indicating bell, 39
Boston Electric Club, 40
Bradford post office, 269, 542
Bradley dynamo, 220
Brake tests, 88
Brighton electric railway, 27, 169, 269
British Association, 41, 195, 260, 285, 315, 342, 368, 443
„ „ grants, 324
„ „ Sketch of the principal electrical papers read before Section A of the, 312
British electricians in America and the Jubilee, 41
Brunel electrical distributor system, 7
Brush lighting in Austria, 65
Brussels Exhibition, 49, 518, 545
Bye products from primary batteries, 594

CABLE—
Antilles, 395
connection for Mauritius, 619
construction, Continental, 295
Formosa, 419
to Hawaii, 144
Henley's South American, 619
to Islay, 67
laying off China, 593
to Mauritius, 144
Pacific Ocean, 90
rates, Atlantic, 169, 196, 267, 278, 350, 468, 593
Repairing Atlantic, 217, 242, 295, 639
Tangiers, 446
tests, 146
West Coast of America, 295
West India and Panama, 20
Cables in Costa Rica, 245
„ Eastern, 493
„ between France and England, 419
„ Government and the, 493, 511, 591, 619
„ Italian, 566
„ New, 242
„ South American, 593
Callender's system of insulation, 544
Carbons, Manufacture of, 507
Cardew, P., on efficiency tests of a Gaulard and Gibbs transformer, 54
Carpenter's automatic electro-air brake, 60, 85
Carpentier's dead-beat electrometer, 91
„ electrically maintained pendulum, 156
Case's carbon primary battery, 283
Cash carriers, 621
Central station lighting company, An arbitrary, 225
„ „ „ by transformers, 454
„ „ „ in America, 540
„ „ Grosvenor Gallery, 2
„ „ in Liverpool, 447
„ „ „ Paris, 19
„ „ „ Philadelphia, 666
„ „ „ Pittsburgh, 667
„ „ „ Vienna, 121, 143, 492
„ stations in Austria, 87, 543, 621, 666
„ „ „ Belgium, 19, 243
„ „ „ Berlin, 66, 541
„ „ „ Brooklyn, 65
„ „ Continental, 268
„ „ at Elberfield, 541
„ „ Lighting from, 501
Challenge, 545
Charterhouse Science and Art Schools, 298
Cheap telegraphy, 196
„ telephone, 297
Cheaper than gas, 545
Chemical ideas, Modern, 244
Chemistry, Thermal and electrical, 244
Chevington railway accident, 625
China switches, 469
Chinese telephone concession, 307, 396
Chubb's electric safe alarm, 15
City and Guilds of London Institute, 21, 170, 217

CITY NOTES—
African Direct Telegraph Company, 22
Anglo - American Brush Electric Light Corporation, 93
„ „ Telegraph Company, 92, 123, 425
Australasian Electric Light, Power and Storage Company, 423
Blackpool Electric Tramway, 569
Brazilian Submarine Telegraph Company, 23, 125, 397, 449, 472, 598
Consolidated Telephone Construction and Maintenance Company, 22, 425
Croydon and District Electric Lighting Company, 376
Cuba Submarine Telegraph Company, 69, 125
Direct Spanish Telegraph Company, 326, 376
Direct United States Cable Company, 377
Eastern Extension, Australasia and China Telegraph Company, 351, 376, 425, 449, 598, 643
Eastern Telegraph Company, 44, 68, 91, 125, 377, 622
Eastern and South African Telegraph Company, 496, 546, 643
Edison and Swan United Electric Light Company, 150, 171
Electro-Metal Extracting, Refining and Plating Company, 397
German Union Telegraph and Trust Company, 568
Globe Telegraph and Trust Company, 93, 125, 147, 397
Gülcher Electric Light and Power Company, 642
Hammond Electric Light and Power Supply Company, 471
India Rubber, Gutta Percha, and Telegraph Works Company, 69, 92
Indo-European Telegraph Company, 450
Lancashire and Cheshire Telephone Exchange Company. 221, 246
London Platino-Brazilian Telegraph Company, 496
Manchester and District Edison Electric Light Company 246

CITY NOTES—*continued.*
  National Company for the Distribution of Electricity by Secondary Generators, 643
  „ Telephone Company, 147, 173
  Pilsen-Joel and General Electric Light Company, 496, 521
  Reuter's Telegram Company, 397
  South of England Telephone Company, 22, 68, 496, 546, 569
  Spanish National Submarine Telegraph Company, 570
  Submarine Telegraph Company, 93, 124
  Telegraph Construction and Maintenance Company, 69, 92
  Telephone Company of Austria, 23, 670
  United River Plate Telephone Company, 351, 377
  United Telephone Company, 22, 42, 546
  „ „ „ of the River Plate, 221
  Water Primary Battery Company, 424
  West Coast of America Telegraph Company, 23, 643, 670
  „ India and Panama Telegraph Company, 450, 496, 520
  Western and Brazilian Telegraph Company, 397
  Woodhouse and Rawson, 472

Cobalt salts, Electrolysis of, 503, 527, 551
Coefficient of self-induction, Modification of Maxwell's method of measuring the, 62
Collisions at sea, 373
Colonial conference and the telegraph question, 143
Combined switch and fuse, 256
  „ telegraph and telephone, 168
Commercial Cable Company, 419
Communication with lightships, 38
Competition in electricity, 244
Compound-winding case, 545
  „ „ dynamos, 583, 613, 620, 630, 639, 655
  „ wound dynamos, 573
Compressed air for electric lighting, 108
Conductors of electric tram lines, 167
Connection of several dynamos in the same circuit, 484
Consolidated Telephone Construction and Maintenance Company, 459, 519
Construction of iron curtains for theatres, 621
Continental cable construction, 295
  „ central stations, 268
Contribution to the knowledge of accumulators, 55
Conversazione, National Telephone Company's,
  „ of the Telegraph-Engineers, 544, 627, 640
Cooper, John N., on a simple proof of the law of the secohmmeter, 577
Copper, Price of, 626, 641, 649
  „ wire, 566, 620
Copyright in catalogues, 621
Cornell professor of physics, 218

CORRESPONDENCE—
  Action of oils on metals, by " W.," 523
  Ayrton's "Practical Electricity," by " A. J.," 499
  Balancing friction by magnetism, by A. Reckenzaun, 571
  Barney's telephone, by W. C. Barney, 276
  Bilbao-Santurce Tramway Company, by J. Arias, 379
  Blackpool tramway, by J. Slater Lewis, 176, 223
  „ „ by M. Holroyd Smith, 176
  „ „ by F. Bryan, 200
  „ „ by "Manchester," 200
  Bogus electrical belts, by William Lynd, 672
  Bonta telephone patents analysed, by W. C. Barney, 354
  British Association notes, by Oliver J. Lodge, 404
  Breakdown of motor armatures, by W. Danton, 199
  Buckling of secondary battery plates, by F. Broadbent and A. P. Haslam, 303
  Cable tests, by Dr. A Tobler, 94
  „ „ by H. Casenhem, 152
  „ „ by Arthur Dearlove, 152

CORRESPONDENCE—*continued.*
  Calibration of measuring instruments, by Sir Thomas S. Bazley, 127
  „ of measuring instruments, by Sidney Evershed, 175
  Carbon transmitter, by W. C. Barney, 522
  Carbons for arc lamps, by Charles H. Cathcart, 327
  Causes of unsteadiness in arc lamps, by F. de Wolfers, 272, 328, 351, 399
  „ „ in arc lamps, by Charles Lever, 302, 379, 401
  „ „ in arc lamps, by " J. S.," 303
  Compound winding litigation, by John S. Sellon, 623
  „ „ litigation, by Theophilus Varley, 647
  „ „ litigation, by S. Alfred Varley, 647
  Contradiction, by Siemens Bros., 128
  Copper wire, by Morgan Brooks, 403
  „ „ by J. Gavey, 451
  Decomposition of alloys, by Oliver Lodge, 356
  D'Humy battery, by P. D'Humy, 351
  Distribution of electricity, by Paris and Scott, 304
  Driving dynamos by short belts, by "C.E., jun.," 95
  Eclipse primary battery, by Silvauus P. Thompson, 199
  Edison and Swan United Electric Light Company *v.* Shippey Bros., by Shippey Bros., 624
  Edison's mystery, by " Filacer-Filacium," 427
  „ phonograph, by J. A. Berly, 547
  Electric current meters, by " Brum," 356
  „ light in towns, by T. E. Stinges, 647
  „ Lighting Bill, by Hugh Watt, 72
  „ meters for central station lighting, by Arthur Goldsbrough, 24
  „ motor tests, by A. W. Slater, 24
  „ street cars, by Gerald Percival, 476
  Electrical association, by J. F. Albright, 427
  „ „ by F. L. Rawson, 427
  „ belts, by "A Poor Victim," 648
  „ students and alternating currents, by " A Student," 645
  „ tenders, by "A Practical Engineer," 224
  „ „ by W. Clark Fisher, 224
  Electro-deposition of alloys, by Alexander Watt, 304, 380
  Elieson's electric locomotives, by Radcliffe Ward, 198
  Erecting telephone lines, by " E. B. F. H.," 175
  Evolution of the telegraph, by S. Alfred Varley, 247
  Examination papers, by " Birkbeck," 128
  Explanation necessary, by R. E. Crompton, 327
  Explosion of glow lamps, by B. F. Howard, 48
  Extended Electro-Metal Extracting, Refining and Plating Company, by " Doubters," 644
  „ Electro-Metal Extracting, Refining and Plating Company, by " Enquirer," 644
  Flickering in arc lamps, by C. L. W. Fitzgerald, 355
  Goolden and Trotter, Limited, by A. P. Trotter, 380
  High speed and low speed dynamos, by W. H. Eaves, 275
  „ „ and low speed dynamos, by Jas. Swinburne, 301
  „ „ and low speed dynamos, by Sydney F. Walker, 301
  Humming of telephone wires, by Major C. F. C. Beresford, 404
  Incandescent lamp patents, by W. Hamilton, 198, 300
  „ „ patents, by Arthur Shippey, 198, 274

CORRESPONDENCE—*continued.*
  Incandescent lamp patents, by D. S. Sinclair, 224, 301, 355
  Information furnished, by " Veritas," 152
  „ wanted, by " Bostox," 128
  „ „ by C. Latimer, 475
  Insulation of underground wires, by Chas. Bright, jun., 428
  „ of underground wires, by T. O. Callender, 352, 475
  „ of underground wires, by " F.I.C., F.C.S.," 353
  „ of underground wires, by "W.," 273, 398, 500
  Lever dynamo, by Charles Lever, 474, 571
  „ „ by Paterson & Cooper, 523
  „ „ by H. Jones, 547, 600
  Magnetic permeability of iron, by Alex. P. Trotter, 303, 404
  „ permeability of iron, by J. A. Ewing, 327
  Maxima and minima problems, by F. J. Harris, 247
  Maximum efficiency of shunt motors, by C. G. McEwen, 96
  Measurement of alternating currents, by P. Cardew, 648
  Measuring co-efficient of self-induction, by S. P. Thompson, 396
  Melting copper wire, by " Amateur," 427
  Metallic circuits for telephone lines, by " Inspector," 624
  „ „ for telephone lines, by "Let Well Alone," 646
  „ „ for telephone lines, by " Lineman," 647
  Minimum loss of candle-power, by Chas. Latimer, 671
  Need of the Age, by Killingworth Hedges, 426
  New out-door light, by W. B. Esson, 327
  Parliamentary powers for telephone companies, by " A Glasgow Subscriber," 645
  Phonic wheel, by Lord Rayleigh, 475
  Photograph of the arc, by " D. S.," 199
  Platinoid, by London Electric Wire Company, 175, 223
  „ by James Swinburne, 200
  Practical electrical measurement, by W. E. Ayrton and John Perry, 47
  „ electrical measurement, by Jas. Swinburne, 71
  Primary batteries, by A. R. Bennett, 523, 600
  „ „ by William Webster, jun., 548
  „ „ by G. E. C. Davies, 152
  „ „ by Hugh A. Fergusson, 570, 672
  „ „ by A. Schanschieff, 570
  „ „ by J. W. King, 672
  „ „ for house lighting, by O. C. D. Ross, 498
  Proposed ammeter, by P. Cardew, 672
  Proposed electrical association, by E. Garcke, 452
  „ electrical association, by " Pro Bono Publico," 498
  „ electrical association, by Chas. Latimer, 570
  Pure water primary batteries, by A. M. Tanner, 401
  Pyromagnetic motors, by "W. J. S. B. S.," 301
  Pumping by electricity in coal mines, by Frank Brain, 548
  Railway accidents, by " Enquirer," 304
  Reckenzaun's secondary battery, by John S. Sellon, 271
  „ secondary battery, by " K," 271
  „ secondary battery, by A. Reckenzaun, 378
  „ secondary battery, by E. Frankland, 452
  Sabine's " Electric Telegraph," by H. W. Jenvey, 70
  Schanschieff's battery, by W. E. Moser, 571
  Scientific discussions, by C. Godfrey Gumpel, 600
  Secondary batteries, by " Epstein," 303, 452

Correspondence—*continued*
  Secondary batteries, by A. Reckenzaun, 404
  „ batteries as regulators, by W. Fourneau Collins and Alfred E. Braddell, 356
  Single needle duplexing, by "A subscriber," 428
  „ needle duplexing, by And. S. Dunn, 452
  Society of Telegraph Engineers and Electricians, by A. R. Bennett, 572
  „ „ Telegraph Engineers and Electricians, by "Fareham," 599
  Speed of working cables, by "Enquirer," 548
  Standardising laboratory, by Sydney Evershed, 199
  Startling proposal, by Sydney Evershed, 547
  Submarine research, by "X. X. X.," 524
  „ „ „ Edward Stallibrass, 548
  Sunlight and selenium, by William H. Phillips, 70
  Synchronous multiplex telegraph system, by P. Jensen, 303
  Telegraph in connection with the Colonies, by R. Somerset, 48
  „ Engineers and Electricians' conversazione, by F. H. Webb, 648
  Telephone patents, by W. C. Barney, 96, 499
  „ „ „ John S. Ross, 126
  Telephones not patented, by W. C. Barney, 276, 428
  „ „ „ „ John S. Ross, 326, 401
  Telephonic litigation in the States, by W. C. Barney, 402
  Tensile strength of electrolytic copper, by Alexander Watt, 600
  Testing dynamos, by P. Cardew, 275
  „ „ „ "J. S.," 304
  Theory of the telephone, by W. C. Barney, 378
  Threepenny telegrams, by E. Cox-Walker, 72
  Trade catalogue piracy, by King, Mendham & Co., 648
  Train lighting in Germany, by "Cipher," 548
  Transformer working, by P. Cardew, 498
  Transformers (Continuous current), by Rankin Kennedy, 356
  „ by Paris and Scott, 401
  „ „ Robert Mitchell, 401
  Van Rysselberghe system, by "A Student of Electrical Engineering," 304
  Vested interests in Bath, by H. G. Massingham, 94
  „ „ „ „ „ Philip Jolin, 128
  Water primary battery, by Will. D. Gooch, 300
  „ „ battery, by Fredk. H. Varley, 355
  „ „ battery, by S. L. Cocks, 427
  „ „ battery, by W. H. Smith & Son, 451
  „ „ battery, by D. Monnier, 498
  What is the cause? by R. D. Smillie, 646
  Who can tell? by "A Would-be Advertiser," 427
  Working of arc lamps, by J. S. Ross, 452
  „ „ „ „ J. G. Statter, 476
Cremation in America, 596
Crookes's indicating paint, 74
Crown Prince of Germany, 195
Croydon and its gasworks, 123
Curative electricity, 649
Current meter, Forbes's, 307
Cut-out, An improved automatic, 117
Cutting telegraph wires in Ireland, 468
Cuttriss's siphon recorder, 532

DAMAGE to wires at Plymouth, 221
Dangers of electric light wires, 421
D'Arsonval galvanometer, 20
Dead beat electrometer, Carpentier's, 91
Departing friend, 297
Desmazures and Commelin's accumulator, 422
Development of the mercurial air pump, 556, 587, 610, 632, 659
D'Humy's primary battery, 98, 297
Dial, Gilbert's bridgeless single needle, 556
Did we say so? 566
Disher's primary battery, 626
Dissociation of some gases by the electric spark, 117
Dynamo, Blakey-Emmott, 506
  „ Bradley, 221
  „ design, Analysis of, 463
  „ field magnets, 545
  „ Kennedy's, 653
  „ Lever's, 406, 411
  „ Oerlikon, 40, 196
  „ Paris and Scott's, 651
  „ Pyromagnetic, 257
  „ Schuyler, 146
  „ Theory of the, 183, 210, 230, 255, 281, 309
  „ Victoria, 653
  „ Watt, 358, 373
  „ with internal poles, 669
Dynamos, Compound-wound, 573
  „ Explorations of the magnetic fields surrounding, 186, 205
  „ in the same circuit, Several, 484
  „ Ironclad, 620
  „ Large, 668
  „ Lecture on, 668
  „ Paterson and Cooper's new, 455
  „ Short history of one of Moses G. Farmer's, 437
  „ Weight and output of, 391

EARLY secondary generators, 253
Earth currents and terrestrial heat, 349
"Eclipse" primary battery, 73, 130, 146, 153, 167, 169, 178, 196, 243, 430
Economical disposition of primary batteries, 103
  „ electrical distribution, 31
  „ motive power, 1
Edison Company in France, 143
  „ lamp, A long-lived, 218
  „ system of distribution, 146
  „ Thomas A., on the pyromagnetic dynamo, 257
  „ Thomas A., on a magnetic bridge or balance for measuring magnetic conductivity, 383
Edison's heat generator anticipated, 324
  „ phonograph, 469
  „ polyform, 526
  „ system of electrical distribution based on transformers, 389
Effect of the sun's rays on selenium, 36
Effects of magnetism on strength of iron and steel, 40
Efficiency of the direct *v.* the alternating system of distribution, 543
  „ tests of a Gaulard and Gibbs transformer, 54
Efficient accumulator, An, 325

Electric—
  Apparatus Company, 641
  apparatus for mine firing, 194
  belts, 627
  block signalling, 625
  boat *Countess*, 129
  „ race, Proposed, 74
  Car Company, 330
  car for Australia, 639
  car at Paisley, 495
  cars and secondary batteries, 170
  „ on street tramways, 168
  communication with lightships, 595
  circuit tester, 221
  clubs in America, 542
  current, 529
  „ as a means of increasing the tractive adhesion of motors, 461
  dog cart, Volk's, 668
  fairy fountains, 270
  fire alarms, 39, 170, 640
  haulage, 594
  hoists, 494
  indicating bell, 39
  induction and transformers for electrical distribution, 116
  lamp, Friedlaender's portable, 37
  „ Walker's portable, 668
  locomotion, 543

Electric—*continued*
  locomotion in Brazil, 396
  „ in England and America, 35[illegible]
  „ in Spain, 542
  „ in the States, 324, 382
  „ Storage batteries for, 292
  locomotive, A German, 596
  locomotives, Elieson's, 98, 129, 146, 170 278, 298, 382, 394, 595
  mains, Laying down, 65
  meter, Zacharias's, 639
  microscope, 373
  motor, The Field, 375
  „ Immisch's, 454, 459
  motors on arc circuits, 145
  „ and printing presses, 375
  „ *v.* steam engines, 459
  pendulum, Carpentier's, 156
  pilot engine, 596
  pumping in collieries, 581
  railway, Accident on an, 169
  „ in Austria, 59, 167
  „ in Berlin, 21
  „ at Bessbrook, 574, 603, 639
  „ at Blackpool, 129, 193, 219, 221
  „ at Brighton, 169, 269, 297, 393
  „ at Brussels, 171, 348, 419, 469
  „ in Canada, 349
  „ at Canterbury, Proposed, 597
  „ at Cologne, 422
  „ at Karlsbad, 76
  „ at Littlehampton, Proposed, 242
  „ at Montgomery, 74, 420
  „ in New York, 226
  „ at Philadelphia, 67, 226
  „ at Ryde, 297
  „ at Shoreham, 349
  „ at Southwick, 115
  „ at Stratford, 98, 129, 146, 170, 278, 298, 382, 394, 595
  „ in Switzerland, 349
  „ in Vienna, 518
  „ in the Wild West, 108
  railways, American, 640
  „ and passenger duties, 196
  safe alarm, Chubb's, 15
  search lights, Utility of, 177
  sewing machine, 278
  street car, The largest, 544
  street cars, 414, 438
  target, 420
  telegraph, Evolution of the, 105, 139, 161, 190
  traction, 115, 154
  tramways [see electric railways]
  units, Names for, 21
  welding, 620, 667, 669
  wire dangers, 395
  yacht, 145

Electrical—
  balloon signalling, 123
  chemistry, Thermal and, 244
  communication between light ships and shore, 145, 277, 305
  „ in the House of Commons, 145
  condition of the Peak of Teneriffe, 531
  distribution, 367
  „ based on transformers, Edison's system of, 389
  „ by alternating currents, 534
  „ economical, 31
  „ Storage batteries and, 590
  distributor system, 7
  engineering in the United States, 641
  exhibition in America, 138
  haulage tests, 563
  illumination of the Fleet, 89
  launches in America, 195
  literature, 296, 372
  measurement, Practical, 8, 34, 55, 80, 103, 135, 163, 180, 215, 232, 279, 580, 603, 628, 657
  measuring instruments, 549, 640
  plant, Sale of, 270
  resistance of liquids, 59
  Scale reader, 89
  tables, Prof. Forbes's, 442
  tenders, 177
  transmission of power, 597
  treatment for the morphine habit, 469
  work in Mexico, 39
Electrically played organs, 39
  „ worked tramways, 603

Electric Light—
  appreciated, 350
  and army signalling, 196

Electric Light—*continued*
  conductors, Insulation of, 5, 18
  „ Jointing, 284, 294
  Edinburgh and the, 638
  on a farm, 542
  Fishing by the, 219
  French gas engineers and, 167
  litigation in America, 666
  "Liberty" and the, 347
  Mayor of Birmingham and the, 650
  in naval operations, 447
  Novel use of the, 564
  Parcel post and the, 617
  Photographing moving bullets by the, 543
  and railways, 453, 472
  regulator, A new, 30
  signalling, 493, 565
  in the Suez Canal, 90
  Tewkesbury and the, 638
  Treadmill and the, 638
  versus gas, 294
  wires, Dangers of, 421
  works, Fire in, 41

Electric Lighting—
  Act, 38
  activity, 638
  in Australasia, 543
  in Austria, 65, 87, 543, 666
  of ball rooms, 20
  of the Bank of England, 371, 492
  at Barnsley, 89
  at Bath, 65, 166
  in Belgium, 19, 120, 245, 375
  in Berlin, 66, 121, 217, 243, 422, 639, 666
  at Bicester, 592
  in Birmingham, 466
  of boats, 216
  in Bolivia, 324
  at Bournemouth, 38, 564
  at Bradford, 193, 606, 619, 667
  at Brighton, 322
  of Brighton Pavilion, 65, 553
  at Bristol, 492
  of the British Museum, 267
  at Broadstairs, 592
  in Brooklyn, 65
  in Brussels, 121, 142, 418, 466, 518
  of the Brussels Exhibition, 241, 617
  on the Caledonian Railway, 88
  in Canada, 592
  of the Capitol at Washington, 638
  of the Carlton Club, 194
  at Cathcart, 445
  in the City, 38, 394, 445, 638
  in Clerkenwell, 541
  in coal mines, 65
  combination, 421
  Compressed air for, 108
  Compulsory, 394
  in Constantinople, 65
  in country houses, 592
  Cost of, 447
  in cotton mills, 120
  at Croydon, 20, 143
  at the Dairy Show, 395
  at Detroit, 666
  at the Diamond Fields, 87
  of a distillery, 217
  Domestic, 617
  in Dublin, 329, 565, 637
  at Exeter, 565
  in factories, 565
  Fire risks with, 466
  at Folkestone, 418, 517
  and gas, 517, 541, 638
  at Gastein, 143
  in Germany, 241, 371, 466
  in Glasgow, 83, 418, 617, 619
  of the Glasgow Municipal Buildings, 564
  on the Glasgow underground railway, 565
  golore, 244
  at the Guildhall, 21
  in Hamburg, 298, 466, 519
  at Hastings, 394
  of the Heriot-Watt College, 66
  at Herne Bay, 464
  in Holland, 531
  in the House of Commons, 267
  in India, 565
  in the Inner Temple, 65
  at Ipswich, 593
  in Ireland, 638
  in iron works, 667
  Isolated, in Philadelphia,
  of the Isthmian Club, 492, 519

Electric Lighting—*continued*
  in Japan, 593
  in a Kimberley theatre, 445
  of the Langham Hotel, 669
  in Leamington, 120, 142, 512
  Lectures on, 516, 618
  at Leeds, 517
  of libraries, 217, 330
  in Liège, 120
  in Liverpool, 447
  of Lloyds, Barnetts and Bosanquet's, 441, 508
  in Madrid, 216
  in mills, 417, 637
  in mines, 294, 666
  Motors for, 64
  in the Navy, 20, 38, 347, 418, 668, 669
  at the Newcastle Exhibition, 341
  in newspaper offices, 20, 195
  in New South Wales, 638
  in New York, 20, 325, 564
  in New Zealand, 167
  of the Northern Assurance Company's offices, 494
  in omnibuses, 65
  Open air, 87
  in Paisley, 516
  in paper mills, 638, 667
  in Paris, 19, 38, 169, 225, 518
  of the Paris Hippodrome, 506
  in Parliament, 541
  at Perth, 418
  in Peru, 466
  in Philadelphia, 638, 666
  at Pittsburgh, 667
  at Portsmouth, 269
  in powder mills, 382
  Power required for, 141
  of the President's train, 422, 445
  of the Promenade Concerts, 145
  Progress of, 371
  at Ramsgate, 593
  in Rome, 143
  in Roumania, 167
  Royal Society and, 147
  of the Royal yachts, 565
  on Russian railways, 347
  of Ryde Pier, 38
  in St. Etienne, 142
  in St. James's, 267
  at St. James's Hall, 502, 626
  of St. Pancras Hotel, 205
  at St. Petersburg, 267
  in Scandinavia, 12
  in Scotland, 347
  Something startling in, 395
  of ships, 20, 82, 116, 362, 418, 593, 638
  in South America, 374
  in South Australia, 640
  in Spain, 65, 347, 372, 595
  Storage battery, 517
  at Swansea, 593
  in Switzerland, 242
  of theatres, 19, 38, 50, 66, 87, 121, 167, 169, 216, 217, 269, 278, 322, 347, 372, 382, 517, 541, 592, 593, 618, 619
  of the *Thetis*, 505
  Thomson-Houston system of, 530
  at Torquay, 394
  of trains, 57, 418, 445, 518, 554, 594, 627, 639, 667
  of Trieste, 394
  in Tunstall, 120, 245
  in Turin, 470
  of the Union Bank of London, 102, 493, 518
  in the United States, 27, 142
  in Vienna, 121, 143, 217, 492, 517, 541, 592
  at Waterford, 418
  Water power for, 371, 405, 422
  in Western France, 143
  at Weston-super-Mare, 120, 194, 241, 394, 541, 617
  of the Wild West, 492
  of Winchester House, 194
  from wind, 322
  in works and factories, 324

Electrician, Fearful death of an, 530
Electricians, Gallant, 122, 146, 396
  „ pocket tool, 437
  „ Rival medical, 122

Electricity—
  Competition in, 244
  Curative, 649
  dutiable? Is, 544

Electricity—*continued.*
  Execution by, 218
  Gas and, 41
  Gas lighting by, 566
  Heating by, 145
  Killing dogs by, 145
  Measurement of, for central stations, 13
  Medical, 297, 374, 544, 649
  Modern views of, 407, 431, 455, 479
  as a motive power, 508
  Nature of, 30
  in the Navy, 374, 396, 469
  in New Zealand, 122, 170
  Pumping by, 513
  and railway brakes, 508
  Railway working and, 2, 51, 132, 433, 543
  Rat catching by, 39
  for St. Catherine's Lighthouse, 596
  Shot firing by, 619
  Slaughtering by, 543, 596
  and street railways, 533
  Timing races by, 641
  and tramways, 39
  on the *Victoria*, 89
  and water power, 392
Electrification of air, 375
Electrified Rooms Company, 268
Electrifying an audience, 420
Electro-air brake, Carpenter's 60, 85
  „ chemical coloration of metals, 179
  „ deposition of alloys, Experimental researches on the, 203, 228, 251
  „ deposition of barnacles, 620
  „ Harmonic Society, 454, 594
  „ motive force of magnetisation, 413
Electrolysis of aluminium salts, 4, 29, 52
  „ of cobalt salts, 503, 527, 551
  „ Saline crystals obtained by, 118
  „ of sulphites, 435
Electrometer, Carpentier's dead-beat, 91
Electro-plating, 219
Elieson's electric locomotives, 98, 146, 170, 278, 298, 382, 394, 595
  „ secondary battery, 458
Engine, Bever's high speed, 435
Enterprising journal, 375
Evolution of the electric telegraph, 105, 139, 161, 190
Examination papers, 73
Excellent example, 668
Execution by electricity, 218
Exeter theatre fire, 278, 296
Exhibition, Adelaide Jubilee, 293, 373, 493, 518, 620
  „ American Electrical, 138, 373
  „ Antwerp, 243
  „ Brussels (1888), 49, 241, 518, 596
  „ Glasgow, 230, 479, 542, 654
  „ Inventions, 195
  „ Liverpool Jubilee, 596
  „ Manchester, 10, 100, 156, 227, 308, 373, 420, 516, 576, 620
  „ Newcastle, 16, 341, 417
  „ Russian Lighting, 170
Experimental attempts to obtain aluminium by the dry way, 75, 99, 131
  „ researches on the electro-deposition of alloys, 203, 228, 251
Explorations of the magnetic fields surrounding dynamos, 186, 205
Extended Electro Metal Extracting Refining and Plating Company, 518, 620
Extraordinary meter, 269
Extremes meet, 40

FALSE alarm, 348
False economy, 395
Farmer's dynamos, Short history of one of, 437
Fatal accidents from electric shocks, 382, 650
Fearful death of an electrician, 530
Festing, Major-General, and Abney, Captain, on photometry of the glow lamp, 608, 635
Festivities, 169, 195
Fiat justitia, 447
Field electric motor, 375, 395
Financier, A great, 86
Finsbury Technical College, 86
Fire alarm exhibition, 420
  „ „ by telephone, 217
  „ „ tenders, 195
  „ in electric light works, 41
  „ at the Grand Theatre, 669

Fire preventive insulators, 240
„ in telegraph works, 170, 620
„ in a telephone exchange,
„ in a theatre, 67
Fires in London, 170
„ and wires, 640
Fishing by the electric light, 219
Flash of lightning, 243
Fleet, Illumination of the, 97
Flickering in arc lamps, 447
Flying high, 595
Fools rushing in, 323
Forbes's current meter, 307
„ electrical tables, 442
French gas engineers and the electric light, 167
Friedlaender's portable electric lamp, 37
Fröhlich, O., on the theory of the dynamo, 183, 210, 230, 255, 281, 309

GALES and the wires, 468, 494
Gallant electricians, 122, 146
Galvanometer, "Maxwell-Jolin" dynamo, 77
Galvanometers, D'Arsonval, 20
Gas companies and consumers, 495
„ and electricity, 41, 245
„ explosions, 90, 421, 469, 669
„ lighting by electricity, 566
„ making, Statistics of, 39
„ meter action, 74
„ „ Industrious, 620
„ Price of, 446
„ in theatres, 167
Gaulard and Gibbs transformer, Efficiency tests of a, 54
German electric locomotive, 596
Gilbert's bridgeless single needle dial, 556
Glasgow College of Science and Arts, 544
„ International Exhibition, 220, 479, 542, 654
„ Technical College, Memorial engine for the, 669
Globe, Lea's patent, 40
Glow lamp, Photometry of the, 608, 635
"Going for" Sir William, 494
Good dynamo test, 421
Government and the cables, 493, 511, 591, 619
Grand Theatre, Burning of the, 668
Great Eastern, 446, 639
Grosvenor Gallery central lighting station,
Gülcher Electric Light and Power Company, 298, 322, 602
Gutta percha, 220
„ „ monopoly in America, 87
Guttmann, L., on subdivided transformers, 383

HALIFAX postal telegraphs, 20
Hall effect in metals, 39
Heating by electricity, 145
„ of magnets, 396
Hedges's patent switches and mica foils, 391, 421
Heim, C., on the intensity and consumption of the ordinary sources of light, 577, 607
Helio-telegraph, A new, 470
Hempel's microphone receiver, 89
Hering's secondary battery, 597
Heriot-Watt College, 420
Hexthorpe railway accident, 306, 329, 601
High-speed trunk engine and Victoria dynamo, 653
Historical telegraph instruments, 40
History of the phonic wheel and its application to synchronous multiplex telegraphy, 331, 359
Honours examination, 297
Hopkinson, J., on specific inductive capacity, 537
How to form a primary battery company, 121
Huge telephone scheme, 269
Hughes's induction balance, 469

ILLUMINATION of the Fleet, 97
Imhoff's ampère and voltmeters, 298
Immisch's motor, 454, 459
Incandescent lamp, A new, 88
„ „ litigation, 447
Incandescent lamp for street lighting, 540
„ lamps, Switches for, 100
India Rubber, Gutta Percha and Telegraph Works Company, 396
Induction balance, Hughes's, 469
„ coils, Early secondary generators or, 252
Industrial crisis in France, 640
Industrious gas meter, 620
Insulating material, 220
Insulation of electric light conductors, 518
Insulators, Fire preventive, 240
„ in the House of Commons, 169
Intensity and consumption of the ordinary sources of light, 577, 607
International Cable Company, 619
„ Hygienic Congress, 348
Inventions Exhibition, Accounts of the, 195
Irish, Affairs of W. E., 494
Ironclad dynamos, 620
Iron curtains for theatres, 621
Irregularity of consumption, 19
Is electricity dutiable? 544

JENKIN, Fleeming, Memoir of, 220
Jensen bells at the American Exhibition, 373
„ Electric Bell Company, 626
Jointing electric light conductors, 284, 294
Journalists in Manchester, Reception of, 244
Jubilee illuminations, 18
„ of the telegraph, 17, 19, 39, 109

KENNEDY, Rankin, on early secondary generators or induction coils, 252
„ Rankin, on electrolysis of sulphites, 435
„ Rankin, on storage batteries and electrical distribution, 590
Kennedy's single horse-shoe magnet dynamo, 653
Khotinsky glow lamp, 170
Killing dogs by electricity, 145

LA COUR, Paul, on the history of the phonic wheel, 331, 359, 529
Large battery of storage cells, 219, 323
„ dynamos, 668
„ isolated installation, 144
Largest electric street car, 544
Lartigue railway in the West Indies, 68
Laying down electric mains, 65
Leamington gas dispute, 395
Lea's patent globe, 40
Lecture on the electric telegraph, 595
„ on dynamos, 668

LEGAL—
Edison and Swan United Electric Lighting Company *v.* Shippey Bros., 141, 193, 595
Loeb Chemical Electric Light Company, 595
Pearson *v.* Maxim-Weston Electric Company, 445, 666
Sharp and Kent *v.* D'Humy, 597
Sir Wm. Thomson *v.* Batty, 491
Smart, Black & Co. *v.* United Telephone Company, 492
Smethurst *v.* Lindsay, 18
United Telephone Company *v.* Lancashire and Cheshire Telephonic Exchange Company, 64

Letang, M., on a new electric light regulator, 30
Lever's dynamo and arc lamp, 406, 411
Liepmann battery, 417, 502, 519
Light, ordinary sources of, Intensity and consumption of the, 577, 607
Lighthouse illumination, 641
„ and lightship communication, 145, 605
Lighting from central stations, 501
Lightning conductor contracts, 296
„ conductors, 218, 245, 307, 469
„ fatalities,
„ Flash of, 243
„ Photographs of,
„ rod at St. Bride's, 145
„ statistics in Germany, 468
„ Thunder and, 201
Liquid metallic enamels, 470
Liverpool Jubilee Exhibition, 596
Liverpool tramways, 218
Local authority and its powers, 285
Lodge, Oliver, on the migration of ions and an experimental determination of absolute ionic velocity, 213
„ Oliver, on modern views of electricity, 407, 431, 455, 479
Loeb Chemical Electric Light Company, 620
London central telegraph clerks, 295
Long distance telephoning, 2
„ lived Edison lamp, 218
Luther arc lamp, 486

MAGNET, The, in paper manufacture, 375
Magnetic bridge for measuring magnetic conductivity, 383
„ circuit, 374
„ field, 240
„ fields surrounding dynamos, Explorations of the, 186, 205
Maiche's battery, 270
Manchester dynamo, 269
„ Exhibition, 10, 100, 156, 227, 308, 373, 420, 516, 576, 620
„ postmastership, 620
Manual training, 325
Manufacture of carbons, 507
Manufacturing cost, 194
Massachusetts Institute of Technology, 669
Matronly reserve, 220
Maxim-Weston Company, 594
Maxwell-Jolin dynamo galvanometer, 77
McEwen, C. G., on electrical distribution, 367
Measurement of electricity for central stations, 13
Measuring internal resistance of a battery by means of a telephone, 185
Medal fever, 121
Medical electricians, Rival, 122
„ electricity, 297, 374, 544
Melting copper wire, 373, 396
Memoir of Fleeming Jenkin, 220
Memorial engine for the Glasgow Technical College, 669
Mercurial air pump, Development of the 556, 587, 610, 632, 659
Metallic circuits for telephone lines, 560
Metals, Electro-chemical coloration of, 179
Mexican telegraphs, 324
Mica foils, Hedges's, 391
Microphone receiver, Hempel's, 89
Migration of ions and an experimental determination of absolute ionic velocity, 213
Military experiments with the search light, 218
Miners' electric lamps, 88, 210, 278, 442, 454, 495, 519, 594, 668
„ „ lamp in the States, 323
Missing link, 470
Modern chemical ideas, 244
„ views of electricity, 407, 431, 455, 479
Motive force of the world, 468
Motors for electric lighting, Trials of, 64
Munificent dividend, 567

NAMES for electric units, 21
National Company for the Distribution of Electricity by Secondary Generators, 375
„ Electric Light Association, 219, 238, 266, 292
„ Telephone Company Conversazione, 542
Nature of electricity, 30
Need of the age, A, 381, 429
Newcastle Exhibition, 16, 341, 417

NEW COMPANIES—
Armstrong's Electric Light and Power Company, 495
Automatic Trading Company, 546
Blockley Electric Lighting and Manufacturing Company, 641
British Watch Company, 495
Chatham, Rochester and District Company, 91
Clamond (Continental) Incandescent Gas Light Company, 670
Clamond Incandescent Gas Light Company, 470
Colville Company, 397
Cowles Syndicate Company, 270

NEW COMPANIES—*continued.*
  Croydon and District Electric Lighting Company, 91
  C. Townsend, Hook & Co., 350
  Eclipse Electric Battery Company, 147
  Electric Car and Power Company, 376
  Elieson Electric Company, 22
  Engine Company, 495
  Extended Electro-Metal Extracting, Refining and Plating Company, 470
  General Zinc Recovery and Lighting Company, 495
  H. C. Bull & Co., 22
  Jensen Electric Bell and Signal Company, 641
  Leete Edwards and Norman, 245
  London Electric Supply Association, 245
  Marine Life Saving Appliances Company, 546
  Medico Electric Belt, Truss and Battery Company, 567
  Nightingale Automatic Electrical Machine Company, 621
  Northern Electrical Engineering Company, 245
  Oppermann Electric Lighting and Manufacturing Company, 471
  Orient Electric Light Company, 567
  Phonopore Syndicate, 621
  Platinum Plating Company, 621
  Portland Electric Light Company, 597
  Railway Train Telegraphy Company, 520
  „ Tramway and General Appliances Company, 567
  Schanschieff Electric Battery Company, 196
  South African Gas Company, 448
  „ Metropolitan Electric Supply Company, 567
  Sudworth & Co., 298
  Sunbeam Lamp Company, 622
  Taylor and Tucker, 621
  United Telephone Company of Rosario, 147
  Universal Electric Company, 246
  Welsbach and Williams, 171
  Whitehall Electric Supply Company, 397
  Woodhouse and Rawson, 147
  Wynne's Electric and Closed Tube Tramways Company, 147

New Electric Light Syndicate, 358
Newspaper nonsense, 168
Newton's primary battery, 358
Nicholls, E. L., and Franklin, W. S., on the E.M.F. of magnetisation, 413
Night telegrams, 296
Notes from Scandinavia, 12, 507
Novel switch board, 169
Nursey, Perry F., on primary batteries for illuminating purposes, 489

OBITUARY—
  Beaufort, John St. Lawrance, 591
  Guilleaume, Franz Carl, 591, 617
  Kirchoff, Gustave Robert, 420
  Moseley, Charles, 370
  Stewart, Balfour, 637
  Woodhouse, O. E., 324, 347
  Young, Sir Charles, 296
Occupation of Massowah, 420
Oerlikon dynamo, 40, 196

OFFICIAL RETURNS—
  African Direct Telegraph Company, 196
  Akester Electro Motor and Accumulator Company, 246, 448
  Anglo-American Brush Electric Light Corporation, 171, 326
  „ Portuguese Telephone Company, 448
  Armstrong's Electric Light and Power Company, 567, 670
  Australasian Electric Light, Power and Storage Company, 520
  Bernstein Electric Lamp Company, 622
  Blackpool Electric Tramway Company, 642
  Byng Telephone Company, 147
  Cadogan Electric Light Company, 196, 397
  Carlyle-Elmore, 270
  Chatham, Rochester and District Electric Lighting Company, 123, 597
  Chelsea Electric Supply Company, 22

OFFICIAL RETURNS—*continued.*
  Clamond Incandescent Gas Light Company, 546
  Consolidated Telephone Construction and Maintenance Company, 91, 546
  Cowle's Syndicate, 351
  Crossley Telephone Company, 246
  Dixon and Corbitt and R. S. Newall and Company, 246
  Dollond Electric Ship's Log Company, 123
  Domestic Battery Syndicate, 221, 448
  Eclipse Electric Battery Company, 197
  Edison and Swan United Electric Light Company, 270
  Edison's Indian and Colonial Electric Company, 448
  Electric Apparatus Company, 246
  „ Car and Power Company, 448
  „ Medical Appliance and Truss Company, 397
  „ Tramways Construction Company, 68
  Electrified Rooms Company, 221, 567
  Electro-Metal Extracting, Refining and Plating Company, 495
  Elieson Electric Company, 41, 68, 546
  Engine Company, 520
  Equitable Telephone Association, 68, 246
  Exchange Telegraph Company, 246
  Extended Electro-Metal Extracting, Refining and Plating Company, 496
  Hastings and St. Leonard's Electric Lighting Company, 22, 471
  H. C. Bull & Co., 41, 221, 597
  Hermite British Electro-Bleaching Company, 221
  International News Association, 568
  Jensen's Electric Bell and Signal Company, 670
  J. E. Slatter & Co., 197
  J. G. Statter and Company, 546
  Indian and Oriental Electric Storage and Works Company, 42
  Kay Bros., 197
  Kensington Court Electric Lighting Company, 147
  Latimer Clark, Muirhead & Co., 642
  Leete, Edwards and Norman, 350
  London Battery Company, 221, 246
  „ Electric Supply Corporation, 270
  „ and Globe Telephone and Maintenance Company, 597
  Magnetic Bell and Signal Company, 299, 622
  Manchester and District Edison Electric Light Company, 325, 397, 448
  Marine Life Saving Appliances Company, 568
  Medical Electric Belt, Truss and Health Appliance Company, 350, 471, 546, 568
  Midland Electric Light and Power Company, 670
  National Telephone Company, 299
  New Electric Light Syndicate, 42
  New Gülcher Electric Light Company, 22
  Nightingale Automatic Electrical Machine Company, 642
  Northern District Telephone Company, 42, 123
  „ Electrical Engineering Company, 351, 546
  Oppermann Electric Lighting and Manufacturing Company, 495
  Orient Electric Light Company, 597
  Ottoman Electric Works Company, 68
  Phonopore Syndicate, 642
  Pilsen-Joel and General Electric Light Company, 597
  Platinum Plating Company, 642
  Portable Electric Lamp and Power Company, 42
  Provincial Gas and Lighting Company, 299
  Railway and Domestic Electric Lighting Company, 670
  Railway Train Telegraphy Company, 642
  Regenerative Electric Light Company, 448
  Rose Primary Battery Company, 270
  Schanschieff Electric Battery Syndicate, 448, 642, 670
  Schmidt-Douglas Electric Company, 299
  South of England Telephone Company, 197
  South Metropolitan Electric Supply Company, 597

OFFICIAL RETURNS—*continued.*
  Sudworth and Company, 325, 448
  Sunbeam Lamp Company, 642
  Taylor and Tucker, 642
  Telephone Company of Austria, 147
  Telpherage Company, 22
  United Telephone Company, 350
  United Telephone Company of Rosario, 123, 350
  Water Primary Battery Company, 299
  West African Telegraph Company, 221, 270
  Whitehall Electric Supply Company, 496
  Winfield's, 270
  Woodhouse and Rawson, 568
  „ and Rawson Electric Manufacturing Company, 42
  Wynne's Electric Closed Tnbe Tramway Company, 197

On the *Silvertown*, 118
Oppermann Electric Lighting and Manufacturing Company, 515, 594
Overhead wires, 487
  „ „ at Littlehampton, 493
  „ „ in Mexico, 220
  „ „ in New York, 219

PADDOCK, J. R., on telephone investigations, 457
P. and O. steamers at the Review, 122, 146
Paris and the provinces, 446
  „ theatres, Safety in, 67
Paris and Scott's new dynamo, 651
Paterson and Cooper's new dynamo, 455
Pendulum, Carpentier's electrically maintained, 156
Perpetual motion, An alleged, 284
Personal, 89, 123, 145, 243, 270, 297, 373, 396, 420, 446, 468, 495, 567, 593, 668
Petroleum, 325
Philadelphia Street Railway Convention, 508, 533
Phœnix Fire Office rules, 307, 669
Phonic wheel, History of the, 331, 359, 529
Photometry of the glow lamp, 608, 635
Photographing bullets in motion by the electric light, 543
  „ extraordinary, 470
Photographs of lightning, 20
Pocket tool, An electrician's, 437
Popular science lectures, 641
Porous vulcanised fibre, 144
Postal and telegraph reform, 90
Power required for electric lighting, 141
Practical formulæ, 168
  „ electrical measurement, 8, 34, 55, 80, 103, 135, 163, 180, 215, 232, 279, 580, 603, 628, 657
  „ notes concerning storage batteries, 79
  „ School of Engineeering, 641
Price of arc lighting in America, 516
  „ of copper, 626, 641, 649
  „ of gas, 446
Prices and profits, 525
Primary batteries, 270, 477, 545, 629
  „ „ Economical disposition of, 103
  „ „ for illuminating purposes, 489
  „ battery company, How to form a, 121
  „ „ in which carbon is consumed, 281
Production of aluminium, 169
Progress of gas and electric lighting, 371
Prospectus misrepresentations, 566
  „ promises, 454
Protection from electric wires, 396
Provisional order, 567
Pumping by electricity, 513
Pyromagnetic dynamo, 257
  „ generator, 373
  „ motor, 297

RAILWAY accidents, 249, 306, 329, 601, 625
  „ brakes, Electricity applied to, 508
  „ and Electric Appliances Company, 597
  „ station lighting, 298
  „ telegraph offices, 66
  „ working, Electricity and, 2, 51, 132, 433, 543
Railways, The electric light and, 453, 492
Ratcatching by electricity, 39

Rather hard upon him, 516
Reception of journalists at Manchester, 244
Reckenzaun, A., on electric street cars, 414, 438
„ „ on practical notes concerning storage batteries, 79
Reckenzaun's secondary battery, 237
Recreative Evening Schools Association, 88
Regulating processions by telephone, 295
Reverie, 225

Reviews—
Calendar for Electrotechnicists, by F. Uppenborn, 666
Century of Electricity, by T. C. Mendenhall, 17
Construction of Magneto-electric and Dynamo-electric Machines, by Gustav Glaser de Cew, 141
Dictionnaire d'Electricité et de Magnétisme, par Ernest Jacques, 417
Electric Apparatus, Machines and Arrangements, by W. E. Fein, 540
Electrical Pocket Book, by Munro and Jamieson, 123
Electricity for Public Schools and Colleges, 241
Hand-book of Electrical Testing, by H. R. Kempe, 417
Laws of Action of Dynamo-Electrical Machines, by Dr. F. Auerbach, 141
Management of Accumulators, by Sir David Salomons. 665
Progress in Electrotechnics, by Karl Strecker, 665
Recent Advances in Electricity, by Henry Green, 592
Technical School and College Building, by Edward Cockworthy Robins, 165
Theory and Practice of Electro-deposition, by Dr. G. Gore, 666
Transactions of the American Institute of Electrical Engineers, 540
World's Workers, by Van Baren Denslow and Jane Marsh Parker, 592

Ries, Elias E., on the electric current as a means of increasing the tractive adhesion of railway motors, 461
Rimington, E. C., on a modification of a method of Maxwell's for measuring the coefficient of self-induction, 62
„ „ on a method of measuring the internal resistance of a battery by means of a telephone, 185
„ „ on self-induction and its measurement, 158, 181, 208, 253, 279, 310, 339, 362
Rival medical electricians, 122
Royal Society, 567
„ „ and electric lighting, 147
Russian Lighting Exhibition, 170
Ryde electric railway, 296

SAFETY of alternating currents, 350
„ in mines,
„ in Paris theatres, 67
Saline crystals obtained by electrolysis, 118
Sanitary engineering at a discount, 244
Scamped telephonic work, 220
Scandinavia, Notes from, 12, 507
Schanschieff battery, 202, 538, 545, 559, 596
School of Electrical Engineering, 37, 421
Schuyler dynamo, 146
Science and Art Classes, 296
„ „ Department, 91
„ „ Examinations, 83
„ in Parliament, 478
Scientific lecture at the Newcastle Exhibition, 417
„ toys, 529
Secohmmeter, Simple proof of the law of the, 577
Secondary batteries as regulators, 220
„ „ Treatment of, 518
„ „ Use of, 357
„ battery, Elieson's new, 458
„ „ Hering's 597
„ „ Reckenzaun's, 237
„ „ traction, 375
Secondary generator law suits, 220, 295
„ generators, Method of testing, 116
„ „ or induction coils, Early, 252
Secret power again, 543
Seel glow lamp, 324
Selby, P., on primary batteries, 629
Self-induction, Measuring the coefficient of, 62
„ „ and its measurement, 158, 181, 208, 253, 279, 310, 339, 362
„ winding and Synchronising Clock Co., 243
Shocking an elephant, 121
Shocks for alternating currents, 338
Short history of one of Moses Farmer's dynamos, 437
Shot firing by electricity, 619
Siemens's telegraph works, 90
Sign of the times, 374
Silvertown, On the, 118
Simple proof of the law of the secohmmeter, 577
Siphon recorder, Cuttriss's, 532
Sixty thousand pounds!
Sketch of the principal papers read before Section A of the British Association meeting, 312
Slattery, M. M., on electrical distribution by alternating currents, 534
Slaughtering by electricity, 543
Snowstorms and wires, 2, 668
Small electro-motors, 596, 620, 622
„ power motor, 640
Smithfield Club show, 606
Smoke problem, 596

Societies—
Civil and Mechanical Engineers Society, 242
Edinburgh Royal Society, 596
Institution of Civil Engineers, 242, 478
Physical Society, 47, 522, 599, 622
„ „ of Glasgow University, 620
Royal Scottish Society of Arts, 545
Royal Society, 494, 545, 620
Société Belge d'Electriciens, 595
Society of Arts, 494
„ of Engineers, 469
„ of Telegraph-Engineers and Electricians, 44, 226, 522, 574, 596
Something wrong somewhere, 594
South African telegraph tariffs, 244
South of England Telephone Company, 542
Spanish torpedo boat, 66
Specific inductive capacity, 537
Spiel's petroleum engine, 269, 349, 574
Statistics of gas making, 39
Statter & Co.'s new works, 460
Steam engine trials, 89
„ engines, Electric motors *v.*, 459
Stockholm General Telephone Company, 84
Stockport gas engine, 494
Storage batteries for electric locomotion, 292
„ „ Practical notes concerning, 79
„ „ and electric distribution, 590
„ battery plant, A large, 323
„ cells, A large battery of, 219
Street lighting, Incandescent lamps for, 540
Student's meeting, 542
Submarine boats, 350
„ Cables Conference, 40
„ „ at Costa Rica, 245
„ Telegraph Company, 518
„ „ Company's contract, 194
„ telephony, 309
"Sun" portable electric lamp, 602, 627
Sunk lightship experiments, 306
Swinburne, J., on practical electrical measurement, 8, 34, 55, 80, 103, 135, 163, 180, 215, 232, 279, 580, 603, 628, 657
Swinton's telephone, 269
Switchboard, A novel, 169
Switch and fuse combined, 256
Switches, China, 469
„ Hedges', 39
„ for incandescent lamps, 100
„ Novelty in, 257
Synchronous multiplex telegraph system, 212

TAMINE'S accumulator, 88
Tampering with telegrams, 298, 323, 446
Technical education, 2, 41, 89, 430, 502, 601
„ training, Another plea for, 192
Technological examinations, 188, 295
Telautographe, 196
Telegrams, Night, 296
„ Tampering with, 298, 323
„ Threepenny, 2, 21

Telegraph—
in America, 372, 467, 606
between Burmah and China, 566
at the Cape, 241
in Central Asia, 566
in Ceylon, 468
in China, 144, 242
clerks, 169
in the Crimea, 234
Dutch, 567
Evolution of the electric, 105, 139, 161, 190
at Halifax, 20
A helio, 470
in the Highlands, 41
in India, 492
instruments, Historical, 40
insulators, 144
in Italy, 467
in Japan, 295
Jubilee of the, 17, 19, 39, 89, 109
line across the Luan-ho, 619
in Mexico, 324
offices, Railway, 66
pole on fire, 145
question, The Colonial Conference and the, 143
reform, 90
in the Scottish Isles, 87
in South Australia, 468
in Spain, 66
staff, 194
superintendents, 38
in Switzerland, 267
Synchronous multiplex, 212
in Tonquin, 566
Tory Island and the, 170
Tribute to the, 22
in Venezuela, 348
wires broken, 220, 221
„ Cutting, 468
works on fire, 170, 620
„ Siemens's, 90
Writing, 76
Telegraphic communication with the Mauritius, 144
„ with Paris, 446
„ reforms, 323, 349
Telegraphists, Grievances of the, 372
„ and Jubilee services, 91
Telegraphitsts' athletic sports, 196
„ School of Science, 396
Telegraphing in the Belgian army, 577
„ Cheap, 196
„ from moving trains, 15
„ in the Jubilee week, 53
Telegraphs, The German, 593
„ Railway, 493
Telegraphy Competition in, 606
„ and lightships, 242
„ Optical, 467
„ Train, 436

Telephone—
in Australia, 218
in Austria, 221
in Berlin, 241
The Bonta, 235
in America, 467
in Austria, 493
in Ayrshire, 566, 593
boom, A, 542
at Bournemouth, 323, 493
at Brighton, 66, 372, 441
call rooms at railway stations, 294
Canterbury and the, 565, 593
in China, 108, 145, 307, 396
companies and the Government, 325
in Denmark, 542
at Dorchester, 194
at Eastbourne, 194
exchange, A military, 446
at Exeter, 38
in Fife, 565
Fire alarms by, 217
in Germany, 294
in Great Britain, 618

TELEPHONE—*continued*
  at Hastings, 493
  in Hawick, 445
  investigations, 487
  in Jersey, 446
  At Lewes, 66
  lines, Metallic circuits for, 560
  Loeb's, 297
  in London, 25
  between London and Paris, Proposed, 518
  in Melbourne, 446
  in Mid Lothian, 322, 419
  in New York, 467
  in North-East Scotland, 194
  at Paris and Brussels, 27, 395
  patents, American, 119, 395
  Popularising the, 168
  at Portsmouth, 418
  A reed, 145
  Regulating processions by, 295
  in the River Plate, 121, 519
  to St. Bernard, 519
  in Scandinavia, 12
  scheme, A huge, 268
  service in London, 168
  at Shrewsbury, 419
  siren, 90
  Some advantages of the, 667
  at Southampton, 446
  in South Devon, 618
  at Stafford, 466
  statistics, 667
  in Stockholm, 84
  in Sussex, 395
  Swinton's, 269, 467
  in the Tees district, 268
  and telegraph, A combined, 168
  Theiler's, 411
  at Torquay, 194
  in the West of England, 87, 145, 348, 395
  in West Scotland, 295
  in Western Australia, 618
  wires in Dorchester, 348, 372
    „ Humming of, 372, 419
    „ Rating of, 618
    „ Snowstorms and, 2
  in Yorkshire, 217
  wires, 565
Telephones in America, 217
  „ „ Germany, Private, 168
  „ „ hospitals, 639
  „ and the poor, 541
  „ *v.* speaking tubes, 618
Telephonic charges, 357, 395
  „ communication between lighthouses and the shore, 605
  „ communication between ships, 323
  „ communication in case of fire, 418
  „ communication between marine forts, 268
  „ enterprises, 277
  „ reforms, 349
  „ work, Scamped, 220
Telephoning, Long distance, 2, 145, 194
  „ Submarine, 309
Testing secondary generators, A method of, 116
Theatre lighting, 19, 38, 50
  „ supervision, 602
Theiler's portable telephone, 411
Theory of the dynamo, 183, 210, 230, 255, 281, 309
Thermal and electrical chemistry, 244
  „ conductivities of metals, 87
Thermometer, A watch, 494
Thompson, Prof. Silvanus P., on the mercurial air pump, 556, 587, 610, 632, 659
Thomson, J. J., on the dissociation of some gases by the electric spark, 117
  „ Sir William, on the application of the deci-ampère or the centi-ampère to the determination of the electromotive forces of voltaic cells, 575
Thomson-Houston central station in Brooklyn, 65
  „ „ system, 143, 358, 530
Thomson's electrostatic voltmeter, 21
Three card trick, 668
Threepenny telegrams, 2, 21
Thunder and lightning, 201
Thunderstorms, 87, 144, 195, 226
Timing races by electricity, 641
Torpedo boats, 73, 297, 447
Torpedoes, 421
Tractive adhesion, Increasing, 461
Train telegraphy, 436
Transformers for electrical distribution, 116, 454
  „ Note on subdivided, 383
Transmission of power at Craigside, 494
Trials of motors for electric lighting, 64
Trunk line tolls, 347
Tyndall banquet, 21
  „ on heat, 122
  „ on lightning conductors, 245

UNDERGROUND telegraph system, The Waring, 137
Underground wires, 341
  „ „ in Detroit, 543
  „ „ in Dover, 296
  „ „ in Paris, 364
Underwriters' wire, 349
Undesirable friction, 194
"Unemployed," 421
Union secondary battery, 138
United Telephone Company, 90, 602
University College, Bristol, 242
  „ „ Dundee, 243
  „ Extension lectures, 419
Urquhart's portable electric lamp, 602, 627
Use of secondary batteries, 357
Utility of electric search lights, 177

VAN RYSSELBERGHE system, 542, 668
Varley, S. Alfred, on compound-winding dynamos, 583, 613, 630, 655
Vested interests in Bath, 49
Victor turbine, 82
Victoria dynomo, High speed trunk engine and, 653
Volk's electric railway, 297
  „ „ dog cart, 668
Voltaic cells, New combination for, 268
Voltmeter, Pocket, 140
  „ Siemens and Halske's, 423, 446
  „ Thomson's electrostatic, 21
Voltmeters, Imhoff's, 298
Vulcanised fibre, Porous, 144

WAGNER, Frank C., on the analys of dynamo design, 463
Walker's miner's lamp, 668
Waring underground telegraph system, 137
Watch thermometer, 494
Water power, Electricity and, 392, 405
  „ primary battery, 225, 250, 297, 406, 421, 544
Watt, Alexander, on the electro-chemical coloration of metals, 179
  „ „ on the electrolysis of aluminium salts, 4, 29, 52
  „ „ on the electrolysis of cobalt salts, 503, 527, 551
  „ „ on experimental attempts to obtain aluminium by the dry way, 75, 99, 131
  „ „ on experimental researches on the electro-deposition of alloys, 203, 228, 251
  „ „ on saline crystals obtained by electrolysis, 118
Watt arc lamp, 565
  „ dynamo, 358, 373
Weather signals, 195
Weight and output of dynamos, 391
West Coast of America cables, 295
West India and Panama Telegraph Company, 650, 668
Western Electrical Works, Bristol, 269
  „ Union Telegraph Company, 566, 637
Westinghouse alternating system of electric lighting, 333, 364, 385, 464
What's in a name? 348, 544
Which is which? 269
Who is he? 596
Wild West Show at Manchester, 543
Wiring, 651
Wires, Fires and, 640
  „ Snowstorms and the, 2, 668
Whitworth scholars for 1887, 219
Woodhouse and Rawson, 494
Worthy of consideration, 566
  „ of imitation, 639
Writing telegraphs, 76, 226

ZACHARIAS'S electric meter, 639
Zipernowsky-Gaulard proceedings, 295

INDEX—SPECIFICATIONS.

1886.

ABEL, C. D. (9326. Communicated by Siemens and Halske, of Berlin), 222
„ „ (10926. Communicated by Siemens and Halske, of Berlin), 378
„ „ (11003. Communicated by Siemens and Halske, of Berlin), 547
„ „ (14033. Communicated by Siemens and Halske, of Berlin), 670
Alley, S., and Brown, A. G. (13293), 474
Andreoli, E. (8842), 450
Armstrong, A. W. (5971), 23
„ J. T. (8573), 450
Aron, H. (9991), 326
Atkinson, L. B., Goolden, W.T., and Trotter, A. P. (8003), 151
Aveling, T. L. (15075), 671

BARBIER, E., and Leclanche, M. (16823) 599
Barcroft, H. (11512), 497
Beaumont, A. J. (15053), 126
„ W. W. (12818), 547
Biggs, J. M. (10499), 426
Binswanger, G., and Pollak, C. (14106), 671
Bollmann, L. (5409), 300
Boothroyd, B. (12420), 497
Boult, A. J. (10331. Communicated by Dr. Stefan Dubrava, of Prague), 94
„ „ (11660. Communicated by J. C. Reiff, of New York), 497
„ „ (11662. Communicated by J. C. Rieff, of New York), 497
Boyd, D., and Williams, S, (9854), 326
Boyle, R. K. (11291), 497
Branson, P. F. W. (5855), 151
Brown, A. G., and Alley, S. (13293), 474
Browne, A. (6107. Communicated by Dionisio Predrahita, of America), 126
Brunton, S. L., and Statter. J. G. (13987), 670

CABANELLAS, G. E. (2880), 93
Callender, T. O., and Webber, C. E. (10393), 326
Carter, H. (11239), 473
Chadburn, W. (12097), 474
Clark, A. M. (8226. Communicated by A. E. Peyrusson, of Paris), 126
„ „ (15888. Commmunicated by C. Pauthonier, of France), 222
„ „ (9846. Communicated by L. Maiche, of Paris), 271
„ „ (12605. Communicated by C. Diener, of Vienna), 474
„ „ (13712. Communicated by the Electrotechnische Fabrik of Cannstatt), 497
Cooper, C. F., Paterson, E. J., and Hermite, E. (14673), 671
Crocker, F. B., Curtis, C. G., and Wheeler, S. S. (16739), 126
Crompton, R. E. B. (7004), 94; (12880), 474
Currie, S. C. C. (9126), 496
Curtis, C. G., Crocker, F. B., and Wheeler, S. S. (16739), 126

DENIS, J. B. (13989), 497
Desolu, E. H. (9514), 222
D'Humy, P. Raoul de Faucheux (7353), 94
Dick, R., and Kennedy, R. (7919), 174; (12531), 497; (15545), 671
Diener, C. (12605), 474
Dorman, G. E. (8620), 151
Dubrava, Dr. Stefan (10331), 94

ELECTROTECHNISCHE Fabrik of Cannstatt (13712), 497
Everitt, P. (10680), 222

FAIRBANKS, H., and Fairbanks, W. P. (10912), 377
Fisher, H. R. (13971), 670
FitzGerald, D. G. (5542), 126; (7636), 450; (11242), 497
Fleming, J. A. (9478), 450
Furse, H., and Tomlinson, H. (10715), 426

GASSNER, Dr. C. (16810), 497
Gepel, W. (7953), 126
Gibson, J. (7561), 151
Goodman, T. (16810. Communicated by Dr. C. Gassner, of Germany), 497
Goolden, W. T., Atkinson, L. B., and Trotter, A. P. (8003), 151
Granville W. P. (14045), 643
Gutmann, L. (8338), 377

HALL, C. J., and Lowrie, W. (10765), 426
Halske, Siemens and (9326), 222; (10926), 378; (11003), 547
Handford, T. J. (5962. Communicated by E. H. Johnson, of New York), 23
Hanson, L. (8758), 222; (15230), 599
Harris, A. E. (17052), 126
Harrison, H. E., and Phillips, F. C. (8588), 197
Hermite, E., Paterson, E. J., and Cooper, C. F. (14673), 671
Hill, W. S. (14075), 547
Holmes, A. B., and Vaudrey, J. C. (9708),
„ J. H. (12451), 547; (15094), 671
Holt, W. L., and Immisch, M. (9313), 426
House, H. A., and House, H. A. jun. (16456), 670
Howat, A. (14568), 643
Howell, J. W. (6303), 222; (13641), 547

IMMISCH, M., and Holt, W. L. (9313), 426

JENSEN, P. (7806. Communicated by K. Pollak and G. Wehr, of Berlin), 197
Johnson, E. H. (5962), 23
„ J. C. (10202), 222
„ J. Y. (10404. Communicated by A. M. Rosebrugh, of Canada), 497
Johnston, W. R. (7080), 70; (13648), 497
Jones, T. J., and Tasker, W. H. (11101), 497
Julien, E. (2470), 23

KAPP, G. (17056), 671
Kennedy, R., and Dick, R. (7919), 174; (12531), 497; (15545), 671
Kenney Electrical Cash Carrier Company (8412), 450
King, F. (4662), 69
Kornmuller, G. J. (11990), 474

LAHMEYER, W. (14757), 671
Lake, H. H. (2880. Communicated by G. E. Cabanellas, of Paris), 93
„ „ (8739. Communicated by L. Sellner, of Vienna), 126
„ „ (8412. Communicated by Kenney Electrical Cash Carrier Company) 450
Lancaster, E. W. (13563), 497
Lea, H. (9793), 326
„ W. E. (8691), 151
Leclanche, M., and Barbier, E. (16823), 599
Leighton, J. T. (11179), 451
Lever, C. (14765), 671
Liepmann, H. (9432), 426
Loiseau, A., and Pierrard, O. (12833), 126
Lorrain, J. G. (8413), 126; (8181), 222; (13974), 670
„ „ and Waters, S. (13126), 547
Lowrie, W., and Hall, C. J. (10765), 426

MACE, T. (9694. Communicated by the Vitrite and Luminoid Company, of New York), 271
„ (9696. Communicated by the Vitrite and Luminoid Company, of New York), 496
McEvoy, C. A. (9959), 271
Maiche, L. (9846), 271
Mackenzie, W. J. (16440), 644
Maxim, H. S. (4751), 93
Maxwell, W. (8513), 94; (9096), 198; (12117), 474; (15165), 671
Mills, B. J. B. (6303. Communicated by J. W. Howell, of America), 222
„ „ (13641. Communicated by J. W. Howell, of America), 547
Mordey, W. M., Sellon, R. P., and Webber, C. E. (16662), 644

O'KEENAN, C. E. (11834), 497
Oliver, W. S. (10620), 426

PARSONS, C. A. (14026), 643
Paterson, E. J., Cooper, C. F., and Hermite E. (14673), 671
Pauthonier, C. (15888), 222
Pearce, J. E. (7189), 70
Peyrusson, A. E. (8226), 126
Phillips, F. C., and Harrison, H. E. (8588), 197
„ R. E. (14075. Communicated by W. S. Hill, of America), 547
Pierrard, O., and Loiseau, A. (12833), 126

Pitt, Sydney (10912. Communicated by H. Fairbanks and W. P. Fairbanks, of America), 377
Pollak, C., and Binswanger, G. (14106), 671
Pollak, K., and Wehr, G. (7806), 197
Predrahita, Dionisio (6107), 126
Pridham, C. W., and Upward, A. R. (9082), 496

RABBIDGE, P. (12422), 474
Rae, J., and Simpson, J. C. (8995), 198; (8994), 222
Raworth, J. S. (14942), 643
Reckenzaun, A. (8379), 222
Reclus, V. (12491), 474
Reiff, J. C. (11660), (11662), 497
Rhoads, H. W. (8471), 126
Roots, J. (11060), 4967
Rosebrugh, A. M. (10404), 497
Ross, J. S. (13569), 222
Rowbotham, W., and Worsley, F. S. (13761), 598
Russ, N. W. (9310), 271

ST. GEORGE, A. F. (8497), 126
Schanschieff, A. (8832), 198; (10006), 496
Seel, C. (11139), 426
Sellner, L. (8739), 126
Sellon, J. S. (14563), 671
Sellon, R. P., Mordey, W. M., and Webber, C. E. (16662), 644
Serrell, E. W. (14983), 126; (14983A), 498
Settle, M. (14974), 599
Shelbourne, S. F. (8303), 151
Siemens and Halske (9326), 222; (10926), 378; (11003), 547
Simpson, J. C., and Rae, J. (8995), 198; (8994), 222
Smith, C. (7848), 126; (14489), 671
,, G. (14249), 222
,, M. Holroyd (5664)
,, R. A. (7107), 197
Snell, W. H. (12264), 474
Statter, J. G., and Brunton, S. L. (13987), 670
Swan, A. (8137), 271
Swinton, A. A. Campbell (7109), 94

TASKER, W. H., and Jones, T. J. (11101), 497
Taussig, Dr. Sigfried (6574), 69
Theiler, R. (12065), 451
Thomlinson, H., and Furse, H. (10715), 426
Thompson, S. P. (7478), 174
Thoms, W. A. (10477), 126
Thomson, Sir William (9016), 450
Timmins, I. A. (11686), 151
Trotter, A. P., Atkinson, L. B., and Goolden, W. T. (8003), 151

UPWARD, A. R., and Pridham, C. W. (9082), 496

VAUDREY, J. C., and Holmes, A. B. (9708), 377
Vitrite and Luminoid Company (9694), 271; (9696), 496

WALKER, S. F. (5817), 174
,, W. J. P., and Walker, W. P. (12668), 474
Ward, F. (9229), 222
Ward, W. (13111), 670
Waters, S., and Lorrain, J. G. (13126),
Webber, C. E., and Callender, T. O. (10393), 326
Webber, C. E., Sellon, R. P., and Mordey, W. M. (16662), 644
Wehr, G., and Pollak, K. (7806), 197
Wheeler, S. S., Curtis, C. G., and Crocker, F. B. (16739), 126
Willans, P. W. (13186), 547
Williams, S., and Boyd, D. (9854), 326
Wise, W. L. (8995. Communicated by J. Rae and J. C. Simpson, of Montreal), 198
,, ,, (8994. Communicated by J. Rae and J. C. Simpson, of Montreal), 222
Worsley, F. S., and Rowbotham, W. (13761), 598
Wynne, F. (11391), 473

1887.

ADAIR, J. (886), 174
Aird, J. (213), 24
Allison, H. J. (1527. Communicated by Writing Telegraph Company, of New York), 174
,, ,, (5293. Communicated by the Baxter Electric Manufacturing and Motor Company, of America), 223

BAILEY, M., and Warner, J. (1656), 174
Baxter Electric Manufacturing and Motor Company (5293), 223
Boult, A. J. (1393. Communicated by J. F. Munsie, of America), 174

CARD, G. F. (2377), 174

EPSTEIN, L. (4527), 222

FRIEDLAENDER, A. 4213), 222
Frost, J. W. (188), 24

GILL, J. (2079), 174
Gould, C. C., Smith, W., and Scribner, P. W. (460), 152

HEYS, W. E. (188. Communicated by J. W. Frost, of New York), 24
House, W. D. (3125), 222

LAGARDE, G. V. (2835), 222
Lake, H. H. (460. Communicated by C. C. Gould, W. Smith, and P. W. Scribner, of America), 152
,, ,, (1750. Communicated by Count Rudolphe de Montgelas, of Philadelphia), 174
,, ,, (1752. Communicated by Count Rudolphe de Montgelas, of Philadelphia), 174
,, ,, (4696. Communicated by J. T. Murray, of America), 222
Loiseau, A., and Pierrard, O. (1400), 174

MENGES, C. L. R. E. (168), 174
Montgelas, Count Rudolphe de, (1750), (1752), 174
Munsie, J. F. (1393), 174
Murray, J. T. (4696), 222

PARCELLE, A. L. (5328), 223
Pierrard, O., and Loiseau, A. (1400), 174

QUINBY, W. C. (111), 24

RICKETSON, J. C. (1584), 174
Ries, E. E. (1570), 174

SCRIBNER, P. W., Gould, C. C., and Smith, W. (460), 152
Smith, W., Gould, C. C., and Scribner, P. W. (460), 152

WARNER, J., and Bailey, M. (165 174
Wittenberg, C. (429), 24
Writing Telegraph Company (1527

Vol. XXI. No. [illegible] | JULY 1, 1887. | PRICE FOURPENCE.

THE ELECTRICAL REVIEW

LONDON: PUBLISHING OFFICE, 22, PATERNOSTER ROW, E.C.—Subscription per annum, Postage inclusive, in Great Britain, 16s. 6d.; to Countries in Postal Union, of the first class, 21s. 6d.; of the second class (Aden, India, Persia, &c.), 23s. 10d.—New York: D. Van Nostrand, 23, Murray Street, and 27, Warren Street. Paris: Madame Veuve J. Boyveau, Librairie Etrangère, 22, Rue de la Banque. Berlin: A. Asher & Co., 5, Unter den Linden.

JOHNSON & PHILLIPS,

ENGINEERS AND ELECTRICIANS.

OFFICES:—14, UNION COURT, OLD BROAD STREET, LONDON, E.C. WORKS:—CHARLTON, KENT.

TELEGRAPHIC ADDRESS—"JUNO" LONDON.

UNITED EXCHANGE TELEPHONE No. 1010. PRIVATE WIRE, CITY OFFICES TO WORKS.

Manufacturers of all Telegraph Appliances, Materials, and Machinery for Making, Laying and Maintaining Submarine Cables, and Contractors for Underground and Aërial Telegraphs.

Sole Makers of Trott & Hamilton's Patent Grapnel Rope and Trott & Kingsford's Patent Indicating Grapnels.

Iron and Steel Telegraph Buoys, Grapnels, both Patent and Ordinary; Centipedes, Creepers, Mushrooms, Sinkers, Cable Tanks, Picking-up and Paying-out Machinery, Dynamometers, Bow and Stern Gear, Steam and Hand Hauling Gears, Rope and Chain Fittings, Cable Drums, Splicing and Jointing Tools, &c., &c.

Machinery Designed and Constructed for the Complete Equipment of Telegraph Cable Factories and Vessels. Steam and Hand Wire Sounding Machines for Deep and Shallow Water.

PATENTEES AND SOLE MAKERS OF THE

FLUID INSULATOR,

In use all over the world by Government Telegraph Departments, Telegraph Companies, Telephone Companies, Electric Light Companies, and for the transmission of power.

This Insulator is made of [illegible] in various [illegible]

For [illegible]

THE [illegible]

[illegible]